Rationale Sheet

State of Tennessee
NPDES General Permit for
Treated Groundwater Discharges Associated with
UNDERGROUND STORAGE TANK REMEDIATION

PERMIT NO. TNG830000

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I. BACKGROUND

Underground storage tanks (UST's) considered in this rationale sheet are those underground tanks containing stored petroleum fuels, generally at gas stations and truck stops. The tanks are located underground for reasons of aesthetics, space savings, and safety. They range in size from 500 gallons to 40,000 gallons.

If the tank leaks, fuel seeps into the ground surrounding the tank, contaminating groundwater. Cleaning up the contaminated groundwater involves withdrawing the water, removing the contaminants and discharging the treated water into surface waters.

Water pollution control laws require that discharges of such water into the waters of the State of Tennessee or of the United States be permitted by the Department of Environment and Conservation and that the quality of the discharged water meets standards set by the department.

Because permit requirements for all these facilities are similar, and because of the number of facilities now in existence, and expected to be created in the future, it is the division's position that this category of sources would be controlled appropriately under an NPDES general permit. This rationale sheet describes and gives the basis for permit conditions to be applied statewide to these discharges from the treatment of contaminated groundwater associated with underground storage tank remediation.

II. DESCRIPTION OF DISCHARGES

This permit will address only sites contaminated by petroleum fuels, primarily including leaded and unleaded gasolines, or diesel fuels.

The extent of the contamination to the groundwater from a leaking tank depends on several variables. The size of the leak in the tank, the number of tanks with leaks, the fuels which are being leaked, the material surrounding the tanks, (soil type, porous or non-porous rock), the proximity of the groundwater table, as well as other factors all contribute to the degree of the contamination. Discharges of treated contaminated groundwater generally will be between 1,500 to 20,000 gallons per day, based on the number of recovery wells and the treatment system at the site and the hours of operation.

III. PRESENT PERMIT LIMITS

On January 13, 1997, the Division of Water Pollution Control issued NPDES General Permit TNG830000 which contained effluent limitations and monitoring requirements for parameters that both the division and the Division of Underground Storage Tanks (UST) considered significant characteristics of discharges from UST clean-up sites. It was decided at that time that the Division of Water Pollution Control would establish effluent limits based upon available treatment technologies and water quality criteria. These effluent limitations are summarized in the following table.

Effluent Characteristic	Daily Max. Conc. (mg/L)	Sample Type	Monitoring Frequency
Flow		Instantaneous	Monthly
Total Sus. Solids	40	Grab	Monthly
Oil and Grease	15	Grab	Monthly
Total Lead	0.030	Grab	Monthly
Benzene	0.005	Grab	Monthly
Ethyl benzene	0.010	Grab	Monthly
Toluene	0.010	Grab	Monthly
Xylene	0.010	Grab	Monthly
48 Hour LC50	Survival in 100 % effluent	Composite	Monthly for 3 months

Any individual NPDES permits issued by the division in the past for discharges to surface water from UST sites also contained these limitations. The reason is that the majority of these individual NPDES permits were issued after the April, 1990 memorandum of agreement between the Divisions of Water Pollution Control and Underground Storage Tanks.

IV. PERMIT CONDITION METHODOLOGY

A. Technology-Based Effluent Limitations

Under State and Federal law and regulations, a discharge permit must establish limitations equivalent to best available technology (BAT) for toxic pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. For some industry categories, such limitations have already been established by the EPA. This is not the case with UST groundwater remediation discharges; thus the Division will propose best professional judgment (BPJ) limits equivalent to BAT and BCT.

B. Water Quality-Based Limitations

Permits must also contain any requirements, in addition to or more stringent than technology-based limits, necessary to achieve water quality standards or to control all pollutants which may be discharged at a level which will cause, have the reasonable potential to cause or contribute to an excursion above any state water quality standard, including narrative criteria.

V. PROPOSED EFFLUENT LIMITS AND RATIONALE

A. Pollutants to be Limited and Standard Technology

The division proposes limiting the following parameters: Total Suspended Solids (TSS), pH, Lead (Total), Benzene, Ethylbenzene, Toluene, Xylene (BETX), Whole Effluent Toxicity, and Floating Material, Color, Foam and Oil Sheen.

Given the contaminants listed, it is the opinion of the division that the standard method for the treatment of the contaminated groundwater is to be air stripping, or equivalent treatment, followed by activated carbon absorption, if necessary, to meet the effluent limitations set forth in this permit. The division believes that this treatment method is equivalent to BAT and BCT and is used as the basis for the proposed limits.

B. Proposed Limits for Each Parameter

Discussed below is the division's rationale for limitations for each parameter. First, the BPJ-BAT or BPJ-BCT based limitation is presented. This is the chosen limit unless a lower limit is required to protect water quality of the receiving stream.

In determining technology-based limits, the division reviewed Discharge Monitoring Reports (DMR) for the Tennessee sites covered with the previous UST general permit. Data from forty different sites in a period of January 01, 2000 to October 1, 2002 was reviewed. Information included in the data summary below includes number of data samples, average value, standard deviation, median and percentage of date points exceeding the previous permit limit. Median is a statistical term identifying a number that divides numerically ordered data into two equal halves. In easier terms, the median is the middle piece of data when those data are placed in numerical order, or the average of the middle two if there is an even number of items. In order to present the most conservative data analysis, any value reported as “less than” was considered to be present at the reported method detection level (e.g. <0.005 was regarded as 0.005 mg/L for statistical purposes).

Total Suspended Solids

The division proposes a limit of 40 mg/L as a daily maximum concentration. The basis is the department's rule 1200-4-5-.03(2), where 40 mg/L is given as a maximum limit for TSS. The division believes this limit will provide protection of Tennessee narrative water quality criteria, which states, in part: "there shall be no distinctly visible floating scum, oil or other matter contained on or in the waste water discharge."

Out of 447 samples reported on DMRs, an average value for TSS was 22 mg/L ($\sigma = 64$), and the median was 5 mg/L. Of all the data points collected, 91% were less than 40 mg/L.

Floating Material, Color, Foam and Oil Sheen

Monitoring requirement for Floating Material, Color, Foam and Oil Sheen will replace monitoring requirement for Oil and Grease in the new permit. The division proposes a following narrative criteria for Floating Material, Color, Foam and Oil Sheen: “No distinctly visible floating scum, oil or other matter.” This narrative criteria will replace a numeric limitation for Oil and Grease of 15 mg/L.

The State of Tennessee Water Quality Standards for the protection of Fish & Aquatic Life [Chapter 1200-4-3-.03(3) (c)] state there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to fish and aquatic life in the receiving stream. After reviewing the submitted effluent data and consulting with the Division of Underground Storage Tanks, and considering that the standard method for the treatment of the contaminated groundwater is air stripping, followed by activated carbon absorption, it is the division's judgment that a visual monitoring of the effluent will be sufficient to protect the above referenced narrative water quality criteria.

Out of 448 samples reported on DMRs, an average value for Oil and Grease was 8 mg/L ($\sigma = 26$), and the median was 5 mg/L. Of all the data points collected, 96% were less than 15 mg/L.

pH

According to the State of Tennessee Water Quality Standards [Chapter 1200-4-3-.03(3) (b)], the pH for the protection of Fish and Aquatic Life shall lie within the range of 6.5 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours. Considering that some, if not many receiving streams are zero-flow streams under low flow conditions, and will therefore provide little or no buffering capacity for treated contaminated groundwater, the division proposes a water-quality based pH limit range of 6.5 - 9.0.

Out of 503 samples reported on DMRs, 8 samples were above the pH limit of 9 and 45 samples were below the previous permit pH limit of 6.0. Of all the data points collected, 90% were within the previous permit limits. Approximately 10% of the pH results from the previous permit term were reported below the proposed lower pH limit of 6.5.

Lead, Total

Based on a review of the monitoring data and treatment technology, the division's proposed BPJ-BAT limit of 0.030 mg/L as a daily maximum concentration will be retained.

Out of 427 samples reported on DMRs, an average value for total lead was 0.022 mg/L ($\sigma = 0.262$), and the median was 0.005 mg/L. Of all the data points collected, 97% were less than 0.030 mg/L.

Benzene, Ethylbenzene, Toluene, Xylene (BETX)

Benzene, ethylbenzene, toluene, and xylene are typical organic pollutants of petroleum fuel contamination in groundwater, and are among the least volatile components of gasolines. The division proposes that these contaminants be limited and monitored as indicators of the effectiveness of the treatment systems used.

The division's BPJ-BAT level for each of these parameters is 0.010 mg/L as a daily maximum concentration. To insure that the proposed limit protects water quality, this BAT-based level was compared to water quality criteria.

For benzene, E.P.A.'s 1986 Quality Criteria for Water states acute toxicity to fresh water aquatic life occurs at concentrations as low as 5.3 mg/L. The State of Tennessee Water Quality Standards do not include a fish and aquatic life criteria for benzene. For the recreation classified use, Tennessee's standards specify 0.012 mg/L for water and organisms criteria and 0.710 mg/L for the organisms only. The water and organisms criteria are for protection of public health due to consumption of water and organisms and should only be applied to waters designated for both recreation and domestic water supply. The criteria for water classified for domestic water supply is 0.005 mg/L. Because some sites likely to be covered under this general permit will discharge to this water classification, the division proposes that 0.005 mg/L be set as the daily maximum limit for benzene.

Out of 386 samples reported on DMRs, an average value for benzene was 0.007 mg/L ($\sigma = 0.039$), and the median was 0.004 mg/L. Of all the data points collected, 96% were less than 0.005 mg/L.

For ethylbenzene, the division has promulgated concentration levels in the recreation and domestic water supply classification. For the recreation classified use, Tennessee's standards specify 3.1 mg/L for water and organisms criteria and 29 mg/L for the organisms only. The water and organisms criteria are for protection of public health due to consumption of water and organisms and should only be applied to waters designated for both recreation and domestic water supply. The domestic water supply criterion for ethylbenzene is 0.700 mg/ L.

Out of 385 samples reported on DMRs, an average value for ethylbenzene was 0.034 mg/L ($\sigma = 0.561$), and the median was 0.005 mg/L. Of all the data points collected, 98% were less than 0.010 mg/L. The water quality criteria is less stringent than the technologically achievable levels, so the previous permit limit for ethylbenzene will be retained at 0.010 mg/L, as a daily maximum concentration.

For toluene, the division has promulgated concentration levels in the recreation and domestic water supply classification. For the recreation classified use, Tennessee's standards specify 6.8 mg/L for water and organisms criteria and 200 mg/L for the organisms only. The water and organisms criteria are for protection of public health due to consumption of water and organisms and should only be applied to waters designated for both recreation and domestic water supply. The domestic water supply criterion for toluene is 1.000 mg/ L.

Out of 374 samples reported on DMRs, an average value for toluene was 0.188 mg/L ($\sigma = 3.42$), and the median was 0.005 mg/L. Of all the data points collected, 96% were less than 0.010 mg/L. The water quality criteria is less stringent than the technologically achievable levels, so the previous permit limit for toluene will be retained at 0.010 mg/L, as a daily maximum concentration.

For xylene, the division has promulgated concentration levels for the domestic water supply classification. The criterion for total xylenes is 10.000 mg/L. Out of 377 samples reported on DMRs, an

average value for xylene was 0.023 mg/L ($\sigma = 0.265$), and the median was 0.005 mg/L. Of all the data points collected, 93% were less than 0.010 mg/L. The water quality criteria is less stringent than the technologically achievable levels, so the previous permit limit for xylene will be retained at 0.010 mg/L, as a daily maximum concentration.

Whole Effluent Toxicity (WET) Testing

Because the treated discharge may contain some level of toxic substances, i.e. benzene, ethylbenzene, toluene, the division feels toxicity testing is necessary to insure the discharges will not adversely affect the quality of the receiving waters. Based on current individual NPDES permit requirements, and that proper performance of treatment equipment can reduce or eliminate effluent toxicity, the permit will require that 100% effluent have no toxicity. The WET tests to be used are IC25 (Survival, Reproduction, & Growth in 100 % effluent) and 48 Hour LC50 (Survival in 100 % effluent). The species shall be the water flea (Ceriodaphnia dubia) and the fathead minnow (Pimephales promelas). Toxicity will be demonstrated if the 48 Hour LC50 or IC25 is less than or equal to the permit limit (100 % effluent).

The type of WET testing applicable to any discharge depends on the receiving stream low flow conditions. The applicable critical low flow values are determined using USGS data from: "Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority, Nashville, Tennessee, 1996" (or the most current edition, or other appropriate USGS sources). The applicable critical low flow values for Fish and Aquatic Life Protection are: 7Q10 for low flow under natural conditions and 1Q10 for regulated low flow conditions. Discharges into zero (0) low flow receiving streams will have to comply with the numerical effluent limits for IC25. Discharges into receiving streams with a low flow above zero (>0) will have to comply with the numerical effluent limits for 48 hour LC50. If the calculated dilution factor is more than 500:1, and assuming immediate and complete mixing, the permittee can request a waiver of the whole effluent toxicity testing requirement. Calculation of dilution factor is as follows:

$$DF = \frac{Qs + Qw}{Qw} = \text{Dilution Factor}$$

where Qw is a long-term average treated groundwater flow rate and Qs is a receiving stream low flow (7Q10 or 1Q10, see text above). The waiver of the whole effluent toxicity testing shall be made in writing to the division's local Environmental Assistance Center.

C. Monitoring and Reporting Requirements

Monitoring frequency for all parameters shall be once per quarter, except for the new operations and toxicity testing as described below.

For the first three months of operations, monitoring treated groundwater shall be conducted monthly. 48 Hour LC50 acute toxicity testing or IC25 chronic toxicity testing shall be conducted monthly on 2 appropriate test species. If toxicity is determined in any of these tests, annual testing will be required for the duration of the permit. If toxicity is not demonstrated, annual testing will not be required. The division believes this frequency is necessary and adequate to characterize the discharge and to determine compliance with permit limits.

Monitoring results shall be recorded monthly and submitted monthly for new operations and recorded quarterly and submitted quarterly for established operations using Discharge Monitoring Report (DMR) forms supplied by the Division of Water Pollution Control. The results will be submitted to the Division of Water Pollution Control.

D. Other Conditions

Permittees will be required to post a sign at the outfall that serves to notify the public of the nature of the discharge and that the discharge is regulated by the Division of Water Pollution Control.

Numerous standard NPDES permit conditions will be incorporated in the general permit, as required by EPA regulations. Standard requirements regard duty to comply, renotification, proper operation and maintenance, signatory requirements, etc.

VI. NOTIFICATION REQUIREMENTS AND AUTHORIZATION TO DISCHARGE

A. Permit Coverage

The permit will authorize discharges of treated groundwater associated with underground storage tank remediation to waters of the State of Tennessee.

B. Notice of Intent (NOI) Requirements

Facilities who are requesting coverage under this general permit must submit a Notice of Intent (NOI) to be covered under this general permit. A standard NOI form is provided in Appendix A of this general permit. The following information must be included in an NOI:

The legal and official name of the permittee, the address or description of location of the site, the name of county the site is located, site latitude and longitude, location of the groundwater treatment site;

The name of the person, firm, organization, or other entity which owns and/or operates the subject site. The name, title or position, mailing address and E-mail of an official contact person, as well as the site contact person (i.e. local contact, if applicable) and an indication of the mailing address where correspondence should be sent;

A copy of the USGS topographical map, a city map, or a county map, identifying the location of the site and the surface waters receiving the discharge; the site map must show boundaries which extend at least a one mile radius beyond the site of the property;

Number of treated groundwater discharge outfalls at the site; for each outfall, names and stream miles or location(s) of the receiving stream(s) and/or lake(s);

Type of product(s) currently or previously stored in tanks located at the site;

A description of the contamination, assessment study, extent of the contamination, etc.;

A description of the treatment process, e.g., air stripping with activated carbon absorption, etc., and the design capacity of the treatment system;

Expected starting date for groundwater treatment, and estimated life of remediation project; and

The UST Site ID Number and any additional information the division may require.

C. Authorization to Discharge

The division will review each Notice of Intent (NOI) for completeness and accuracy. A complete and accurate NOI shall be processed as described below.

Within 30 days of receipt of a complete and accurate NOI, the division will transmit to the permittee a notice of coverage (NOC) under this permit, which shall specify the effective dates of coverage under the permit. The term of coverage shall end not later than the expiration date of this general permit. If the Division has not been able to transmit an NOC to a permittee within 30 days of receipt of the NOI, discharges are authorized under this permit if the NOI has been assigned a valid NPDES general permit tracking number and the permittee has been informed of this tracking number.

If the division determines the submitted NOI incomplete, or denies an applicant coverage under this general permit, the division shall notify the applicant of this determination. The Permit Section will notify the Division's Enforcement and Compliance Section of the facility and its permit limits, as with individual NPDES permits, for coding into PCS.

VII. PERMIT ISSUANCE PROCEDURES

A. Administration

This general permit is drafted in accordance with applicable NPDES regulations (40 CFR 122, 123, 124 and 125), the Tennessee Water Quality Control Act (§ 69-3-101 et seq.), and the Department's permit issuance regulations (Rules of the Department 1200-4-10-.01, -.02, -03).

B. NPDES Procedures

The applicable regulations for issuance of this general permit are 40 CFR 122.28, 123.44 and fact sheet requirements at 124.8 and 124.56.

C. Schedule for Permit Issuance

Following are tentative dates associated with this general permit issuance process: Public Notice: October 21, 2002; draft permit transmittal to EPA: November 5, 2002; Public Hearing: December 19, 2002; Issuance Date: February 1, 2003.

D. Consideration of Comments and Permit Issuance Decisions

The Division of Water Pollution Control proposes to issue this permit with the described effluent limitations, monitoring and reporting requirements and standard conditions. These conditions are tentative and open to comment. Interested persons are invited to submit comments for consideration, by letter or at the scheduled public hearing.

A hearing will be held on Thursday, December 19, 2002, at 2:00 p.m., C.D.T., in the 17th floor Conference Room of the L & C Tower at 401 Church Street in Nashville.

Comments should be submitted to the following address:

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ATTN: Vojin Janjic
6th Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37243-1534